NAVY AIR & SURFACE WEAPONS TECHNOLOGY PROGRAM (ASWT)

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NAVAL SURFACE WARFARE CENTER, DAHLGREN DIVISION

NAVAL SURFACE WARFARE CENTER, INDIAN HEAD DIVISION

Navy Air & Surface Weapons Technology Program (ASWT)

VISION:

Maintain Naval Air and Surface Weapons Capability Edge Through 21st Century

- **Affordable, Precise**
- **Mission Adaptable, Mission Responsive**
- **Insensitive, Safe**
- **Higher Performance**
- **Higher Effectiveness**

Navy Air & Surface Weapons Technology Program (ASWT)

Major ASWT Program Tennants/Technical POCs BY MISSION AREA	Example Systems or Programs Supported
• Air Superiority (Air to Air Warfare, AAW)	AIM-9X, AIM-120
POC: Mr. Stacey Howard (760) 939-3764	
• Naval Surface Fire Support (NSFS)	VGAS, EX-171
POC: Mr. Roger Horman (540) 653-8737	LASM, NTACMS
• Ship Self Defense (SSD)	CIWS, Standard Missile
POC: Mr. Gil Graff (540) 653-4099	RAM, ESSM
• Precision Strike	
POC: Mr. Tom Loftus (760) 939-3544	Tomahawk, SLAM-ER JSOW, JDAM, HARM

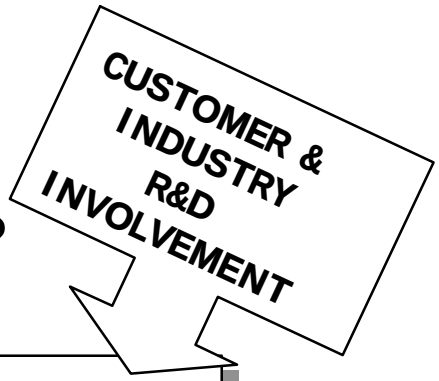
Questions Navy ASWT Program Needs to Answer...

What are we trying to do?

By When?

What difference will it make?

What makes you think you can do it?



Need to Know the Future of Technology,

Not be Surprised by it.

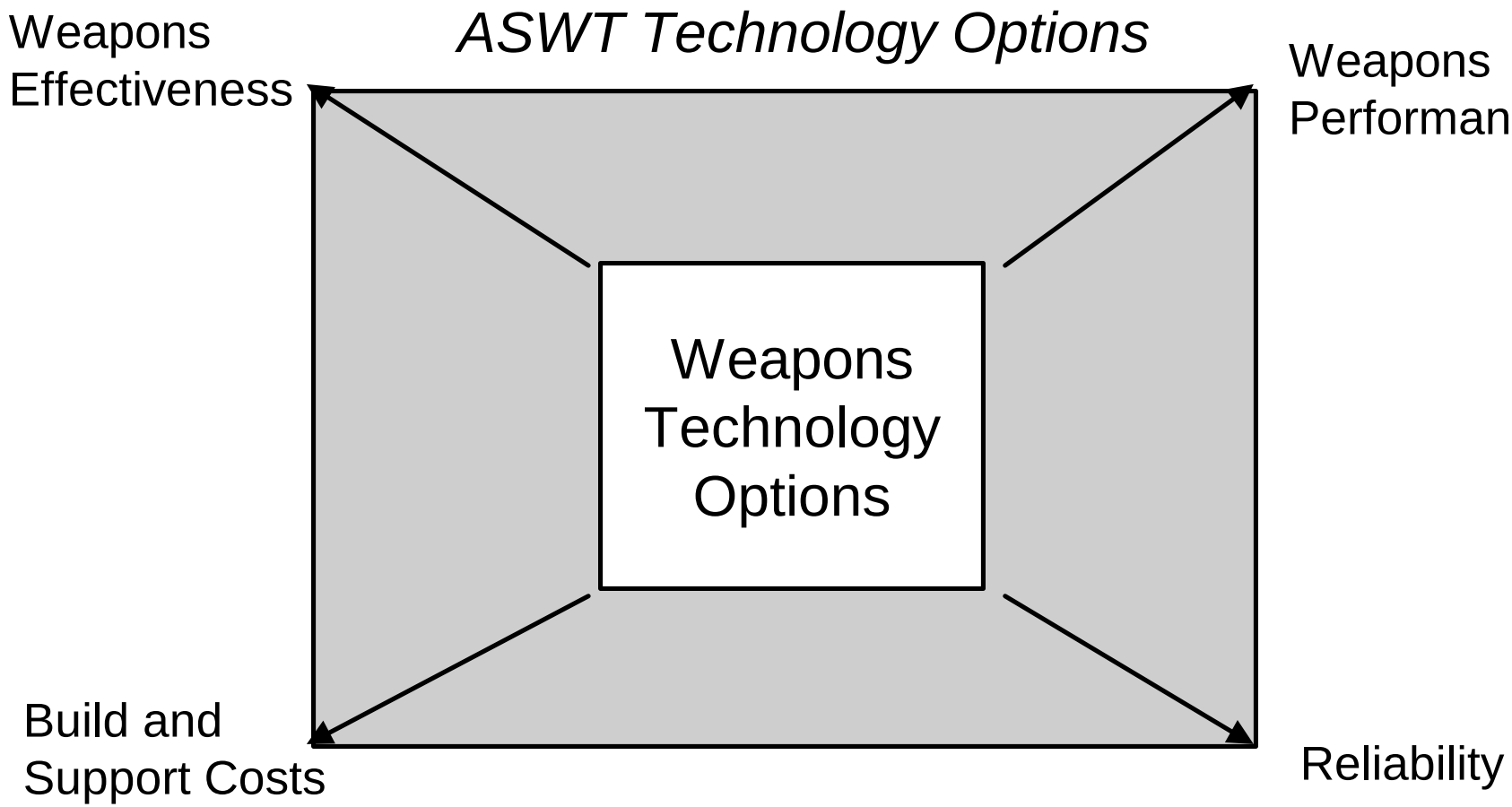
Program Technology "Traceability"

- System Payoff / Warfighter Benefit
- Quantitative Goals
- Objectives to meeting the goals
- Technical challenges
- Approach

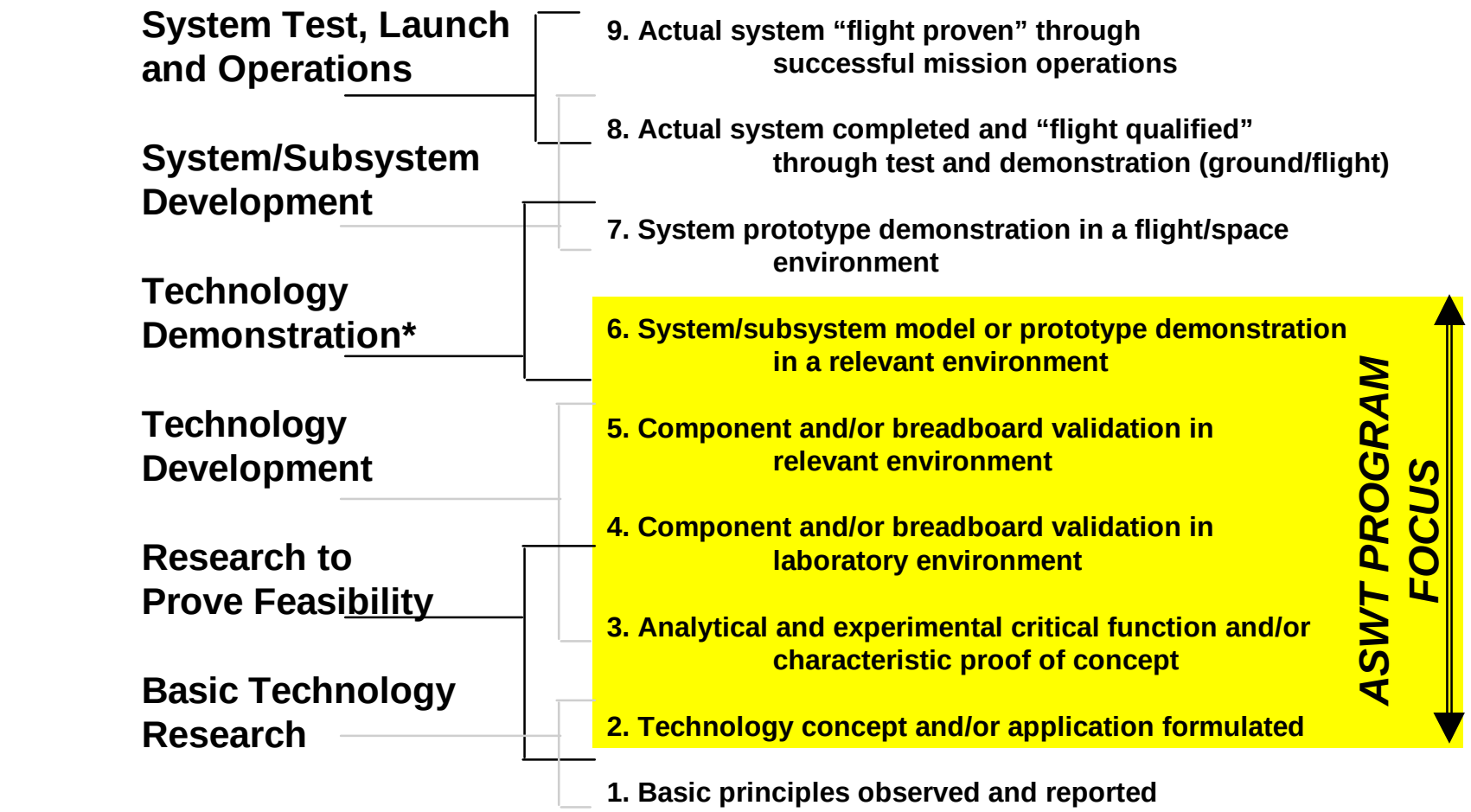
Presents S&T in a Logical Manner

PROMOTES INDUSTRY & COMMERCIAL BASE UNDERSTANDING

ASWT Program Technology Expands the Weapons Design Box

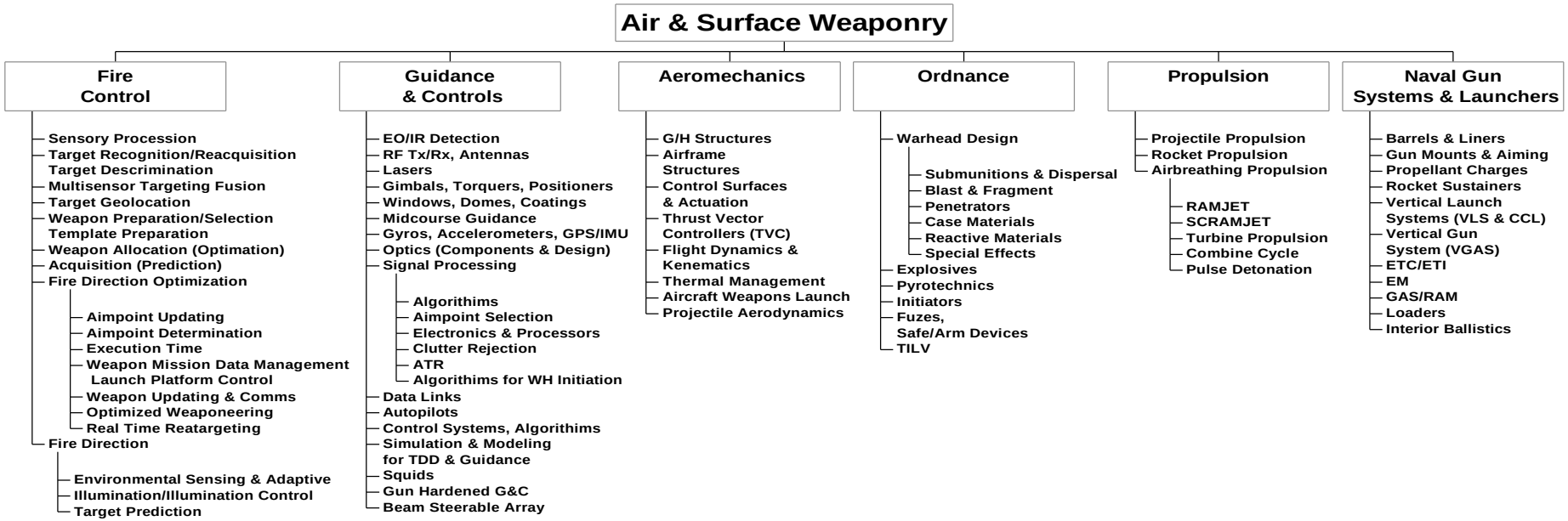


NASA Developed Technology Assessment Scale



** Note: TRL=6 is a threshold level start of DDT and E program*

ASWT TAXONOMY



NAVAL AIR SUPERIORITY TECHNOLOGY GOALS

AAW Goals	Baseline* 1995	2005	2010	2015
MISSILE KINEMATICS				
Flyout Range	AIM - 9X, AIM- 120C	**+ 25 %**	**+ 50 %**	**+ 100 %**
Average Velocity		**+ 10 %**	**+ 20 %**	**+ 30 %**
Maneuverability		**+ 45%**	**+ 65%**	**+ 85%**
Wpn Launch Angle		**+ 20 %**	**+ 40 %**	**+ 60 %**
SEEKER PERFORMANCE				
Acquisition Range	(IR lookdown)	**+ 100 %**	**+ 250 %**	**+ 300 %**
Off Boresight Angle		**135^{o} / 180^{o}**		
Probability Of Detect	(IRCM)	**+10%**	**+ 20%**	**+ 30%**
ORDNANCE LETHALITY				
Warhead Control Accuracy	(Edge Detect)	**Centroid**	**Image Centroid**	**Defined Aimpoint**
Payload Size	AIM- 120C ($\geq$ lethality)	**- 20%**	**- 30%**	**- 50%**
AFFORDABILITY	-	**Guidance Integrated Fuzing**	**Common Processing**	**Multirole Missile**

*** Specific performance data not shown is classified, but can be obtained on official request of the Program Office**

AIR SUPERIORITY WARFIGHTER PAYOFFS

- Baselines
  - **AIM-9X, AIM-120**
- Future Technology Payoffs
  - Increase Target Sets Addressed
  - Improve Exchange Ratios
    - No Escape Zone
    - Launch Acceptability Region
    - Maneuverability
    - F-Pole, A-Pole
    - Off Axis Targeting / Engagement
    - Lethality
  - Reduce Fratricide
  - Improve Weapon Separation

NAVAL SURFACE FIRE SUPPORT TECHNOLOGY GOALS

Naval Fire Support Goals	Baseline 1995	2005	2010	2015
RANGE *Gun* / *Missile*	13 nmi 70 nmi	70 nmi 150 nmi	150 nmi 250 nmi	200 nmi 350 nmi
Weapon Time of Flight *Gun* / *Missile*	90 sec 10min/M1 Slid RK	< 6 min* 5 min/M4 LCMS**	< 14 min* 4 min/M6 DCRJ***	< 10 min* 4 min/M8 Scram****
Sensor to Weapon + Fire Control Time	N/A	2 min*	1.5 min	1 min
ROUND (TARGET) AIMPOINT ACCURACY	30-50m	8-10m	1m	1m (Moving Target)
PAYLOAD ENERGY DENSITY	3000 Kjoules/kg	+ 15 %	+ 30%	+ 45 %
LETHALITY (Rounds per Kill)	10 (Mobility) - Hard 1-2 Soft Targets	3 Mobility	1.2 (Stationary)	1.2 (Hard)
Warhead Characteristics	Fragmentation Submunitions	Submunitions	DUAL FUNCTION	MULTIFUNCTION REACTIVE HIGH ENERGY
TARGET ACQUISITION (Rounds per Kill)	Human Observation Human Image Exploitation	Benign Pd=0.9, FA=0.1/km2 Pdecoy reject=0.9	Man-in-Loop Pd=0.9, FA=0.1/km2 Pdecoy reject=0.9	Fully Automated Pd=0.9, FA=0.1/km2 Pdecoy reject=0.9

** - Note: Increase in Flight Times Due to Increase in Range, ** - Low Cost Missile System ATD, *** - Dual Combustion Ramjet, **** - Scramjet Technology*

Naval Surface Fire Support
WARFIGHTER PAYOFFS

- Baselines
  - **5”/54 MK45, RGM-66 SSSM**
  - **Advanced/Engineering Development: 5”/62, NTACMS, LASM**
- Future Technology Payoffs
  - Increase Effective Range
  - Improve Kills/magazine
  - Robust Targeting
  - Decrease System Response Time
  - Decrease Cost/Kill
  - Increase Target Sets Addressed
  - Enhance Sustainability
  - Increase Availability
    - Weather
    - ECM

SHIP BASED DEFENSE TECHNOLOGY GOALS

SHIP DEFENSE GOALS	Baseline 1995	2005	2010	2015
INTERCEPT RANGE (Min-Max)	120 meters* -1.5 nmi	100 meters -3.0 nmi	100 meters -5.0 nmi	100meters -10.0 nmi
REACTION TIME	20 sec	10 sec	5 sec	5 sec (Adverse Environment)
WEAPON CONTROL-TARGET TYPE	Low Signature Sea Skimming Subsonic	Sea Skimming Supersonic Maneuvering	Low Signature Supersonic Maneuvering	Advanced Sea/Land Based Cruise in Clutter
INTERCEPT, PROBABILITY OF CATASTROPHIC KILL GIVEN IMPACT	0.1-0.3	0.3-0.6	0.6-0.8	0.8-0.95
MAGAZINE CAPACITY AND SIMULTANEOUS TARGETS ENGAGED	1-2	2-4	4	8
WEAPON CONTROL & COUNTERMEASURE DEFEAT	Broadband Jamming & Flares	Broadband Jamming, Towed Decoy & DRFM	Terrain Bounce Jammer	Submissiles, Shaped Decoys Adverse Weather
INTERCEPTOR AVERAGE SPEED	2000 f/s	3000 f/s	6000 f/s	6000 f/s

* - Close in encounters assumed to cause damage, if targeted missile warhead detonates. Minimum damage desired.

SHIP BASED DEFENSE*
WARFIGHTER PAYOFFS

- Baselines: CIWS (Terminal), RAM (Nearby/Short Range)/P3I, NSSM/ESSM (Local/Intermediate Range), Surface Launched Harpoon (Close in), 5”/54 (Std Surface-Surface)
- Raid Survival versus Advanced Threats
  - Signature
  - Altitude
  - Maneuver
  - Speed
- Universally/All Ships Compatible
  - Support PEO desire to Neckdown
- Affordable
  - Development
  - Production
  - Life Cycle

- Robust System Performance
  - –Countermeasures
  - –Weather
  - –Availability
  - –Short Reaction
  - –Situational Awareness

* SM-2 and CE counted as Area/Theatre Defense Weapons

STRIKE TECHNOLOGY GOALS

STRIKE Goals	Baseline* 1995	2005	2010	2015
ACCURATE, RESPONSIVE TARGETING Accuracy (TLE)	(SOAD, SOPD) 30-50 m	8-10 m	1 m	1 m
Target/Weapon Pairing Rates	2/hr	20/hr	100/hr	500/hr
REALTIME RETARGETING Rapid Planning & Optimization	(SOTD) Manual Process Hrs/Aimpoint	< 5 Min.	< 1Min	-
Weapon Based ATR	>90% Acq for Fixed targets	>90%Acq in Limited Clutter	>90% Acq. In Moderate Clutter	> 60% Acq. in Heavy Clutter
Responsive Weapons Ave Velocity	SUBSONIC (M<1)	M=4	M=6	M=8
Weapon Flyout Range	A/L SOAD	+30%	+ 50%	+100%
Hard target Penetration	JDAM/BLU-109 SLAM-ER	5x	7x	TBD
SENSOR PERFORMANCE GPS Guidance	ANTI-JAM (S/J)	+10dB	+ 30 dB	+30 dB
Imaging Seekers	Limited Clutter	3m (Natural)	10 m (Structured)	3 m (All Clutter)
Target Detection Devices (TDDs)	Height of Burst	Direct - Masted	Direct in Clutter	Direct Occluded
AFFORDABILITY	-	Common Processing	Common Sensors	Multi-Mission Multi-Role Missile

STRIKE MISSION WARFIGHTER PAYOFF

- Baselines
  - **A/C Guns & Rockets, GP Bombs, JDAM, JSOW, JSOW Unitary, SLAM/SLAM ER, HARM Blk V, Tomahawk Blk IV**
  - **Launchers: F-18, JSF, Ships & Subs**
- Future Technology Payoffs
  - Enlarge Engagement Envelope (Time of Arrival, Range)
  - Decrease Response Time (Time to Target, MP Timeline)
  - Increase Survivability
  - Increase Lethality (Payload, Weapons/Kill, Accuracy)
  - Increase Target Sets Addressed (Time Critical, Relocatable, Hard, Area, Mobile)
  - Affordability
  - Mission Flexibility (Retargeting)
  - Firepower (Loadout, Kills/Pass)

SUMMARY

– Navy has instituted a structured, disciplined technology planning/execution process that provides a national focus

– Strong linkage to Strategy-to-technology process

– Process provides for strong Government/Industry/Academia participation and Investment

– Navy ASWT Program modeled after highly successful IHPTET/IHPRPT Programs

– Provides a rationale/framework for Navy S&T and Industry IR&D investments in areas of Naval ASWT

A consistent, stable funding line guarantees a consistent, stable flow of Navy Air & Surface Weapon Technology Options

Navy ASWT
Ongoing Programs

HYPERSONIC SPEED WEAPON SYSTEM (M > 6)

TOPART - UAV BASED HIGHLY ACCURATE TARGETING SYSTEM

CRUISE MISSILE REAL TIME RETARGETING (CMRTR)

UN-INHABITED COMBAT AIR VEHICLES (UCAVS)

IHPRPT - INTEGRATED HIGH PAYOFF ROCKET PROPULSION TECHNOLOGY (DOD/INDUSTRY WIDE PROGRAM)

ADVANCED ANTI- RADIATION GUIDANCE DEMONSTRATION (AAGD)

SURGICAL STRIKE ADAPTABLE VIDEO AND DATA COMMUNICATIONS SYSTEM

CONCENTRIC CANISTER LAUNCHER (CCL)

PRECISION STRIKE NAVIGATOR (PSN)

BALL JOINT GIMBAL

NAVAL FIRE CONTROL SYSTEM (NFCS)

GUIDANCE INTEGRATED FUZING (GIF)

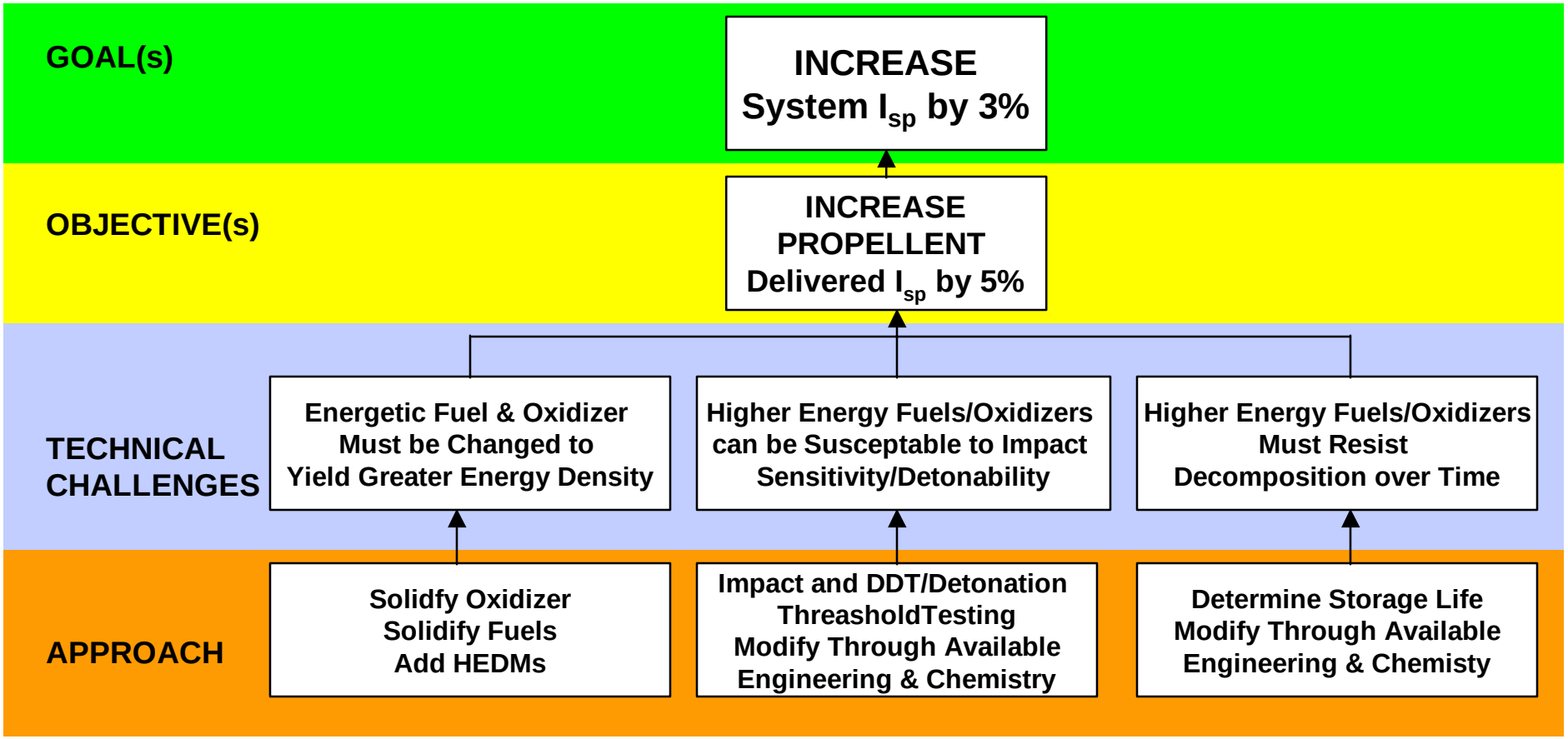
SHIP BASED LASER MISSILE DEFENSE SYSTEMS

Illustrative Example: Typical "GOTCHA"

Goal - Objectives - Technical Challenges - Approaches

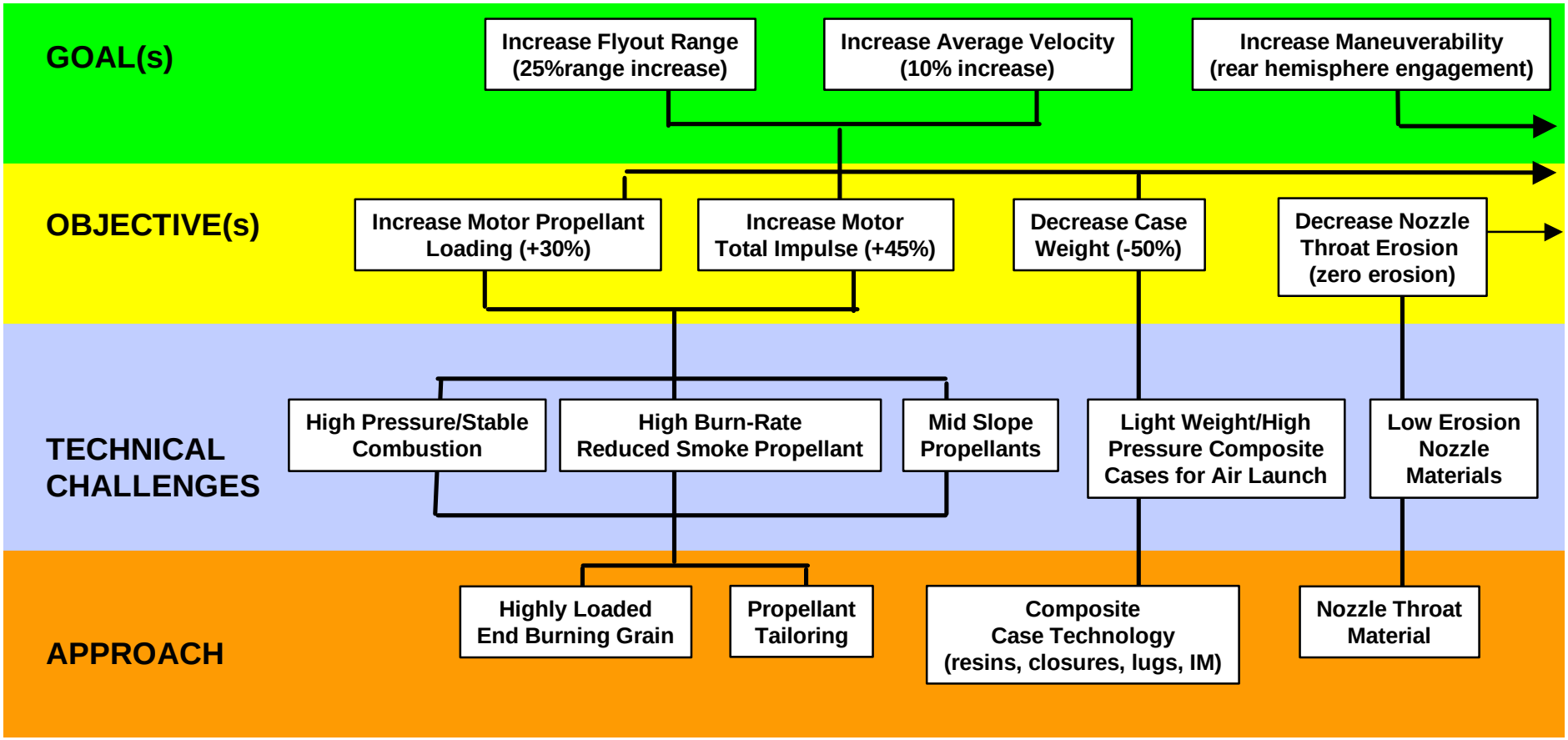
Chart

(From IHPRTPT Program Documentation)



Illustrative Example: ASWT Air Superiority FY05 Goals - Propulsion

FOR EXAMPLE ONLY, NOT MEANT AS GUIDANCE



INDUSTRY PROPOSALS

PREVIOUS GOOD BAA PROPOSALS MIGHT INCLUDE...*

- **MISSION AREA SUPPORT DISCUSSION**
- **STATEMENT OF WORK - TECHNICAL BASIS, APPROACH, SUMMARY & GOTCHA CHARTS**
- **TARGETED SYSTEM / MISSION FOR TECHNOLOGY TRANSITION**
- **DETAILED ROADMAP**
  - **PROGRAM PLAN BY QUARTER AND GOVERNMENT FISCAL YEAR (OCT-SEPT)**
  - **FISCAL INFORMATION BY QUARTER AND GOVERNMENT FISCAL YEAR (OCT-SEPT)**
  - **IDENTIFIED IR&D INVESTMENTS**
  - **IDENTIFIED LEVERAGED FUNDED PROGRAMS (BY DoD PE Number)**
  - **PRODUCTS / DELIVERABLES SCHEDULE**
- **PROPRIETARY CLAIMS**
- **MANAGEMENT APPROACH**
  - **TEAMING, SUBCONTRACTORS or PARTNERS**
  - **ORGANIZATIONAL CHART**
- **VENDOR DESCRIPTION**
  - **COMPANY SIZE, LOCATION, SPECIALIZED EQUIPMENT**
  - **EXISTING RESEARCH & DEVELOPMENT EFFORTS**

** - To Be Considered as Guidance only, Not Direction.*

NAVY ASWT - INDUSTRY DAY CONFERENCE 1998

DATE: 9-10 JUN 98 (Tuesday & Wednesday)

TIME: 0830-1700 hrs (Registration begins at 0730)

LOCATION: GEORGE MASON UNIVERSITY
PROFESSIONAL CENTER
3401 N. FAIRFAX DRIVE
ARLINGTON, VA 22201

CLASSIFICATION

LEVEL: UNCLASSIFIED - U.S. CITIZENS ONLY